

## Mental Disorder as a Risk Factor for Human Immunodeficiency Virus Infection in a Sample of Veterans

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People who suffer from mental disorders are at increased risk for becoming infected with HIV. There have been no studies that show whether particular psychiatric disorders present an increased risk for HIV infection in samples of nonpatients. This article uses data from the 1992 National Survey of Veterans to determine if veterans with post-traumatic stress disorder (PTSD), or with other mental or emotional problems, are at increased risk for HIV infection. The results indicate that the combination of PTSD and substance abuse increased the risk of HIV infection by almost 12 times over those without either. This is evidence of a particular psychiatric disorder increasing risk for HIV. Although cross-sectional, these data allow some conjecture about the timing of the onset of PTSD in relation to HIV infection. These results present powerful evidence that mentally ill persons such as those with PTSD, who may be underserved for health services including AIDS prevention efforts, should be targeted as an at-risk group.

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It has been estimated (Holmberg, 1996) that there are 700,000 prevalent AIDS cases in the U.S., with nearly 41,000 new HIV infections annually. Incidence rates are highest among intravenous drug users (IVDU), and male cases outnumber female by almost 6 to 1. Hispanic and African Americans have disproportionately high rates (Ford et al., 1994).

Persons with mental disorders have been shown to have disproportionately high HIV infection rates (Cournos et al., 1994; Sitzman et al., 1995). Among a sample of homeless men with serious mental illness, Susser found an HIV prevalence rate of nearly 20% (Susser et al., 1993). In a sample of dually diagnosed patients, 23% were HIV positive (Silberstein et al., 1994). The association between mental disorder and HIV is sufficiently compelling to search for specificity in the types of disorder that present the greatest risk for infection.

Three explanations for the association between mental disorder and HIV can be proposed. Substance abuse, a known risk factor for HIV and highly prevalent among persons with mental disorders, may explain the association. For example, episodes of depression among IV drug users increase injection frequency (Latkin and Wallace, 1993), increasing the likelihood of unsafe injection practices. Second, features of mental disorder could directly

increase the odds of infection. For example, disinhibition, poor impulse control, or social instability could increase risk for HIV infection (Sacks et al., 1992; Volavka et al., 1992). Finally, persons with mental disorders are disproportionately represented in groups difficult to target for AIDS prevention efforts such as the homeless and very poor (Susser et al., 1993). The co-aggregation of mental disorders and HIV infection in these groups could result in a spurious association.

It is unlikely that any one explanation accounts for the association between mental disorder and HIV. However, regardless of whether the mentally ill are at risk due to comorbid substance use, mental disorder alone, or because they are members of at-risk groups, they are a consistently underserved population. While more likely to mention psychiatric symptoms to physicians (Robbins et al., 1991), and more likely to seek services, only a small proportion obtain treatment specifically for mental illness, and treatment rates are lowest and most limited among the poor (Leaf et al., 1988).

For the mentally ill in treatment, HIV/AIDS education is not a standard part of psychiatric services (Kalichman et al., 1994), for either patients or staff (Birenbaum, 1995), due in part to the fact that the sexual lives of psychiatric patients are often overlooked (Carmen and Brady, 1990). In addition, substance treatment programs have been reluctant to educate clients about, for example, clean needles, because it is viewed as contradictory to a policy of abstinence.

An inherent difficulty in studying the role of mental disorder in HIV infection is the lack of longitu-

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dinal data. Much data to date has been cross-sectional (Lyketsos and Federman, 1995), making temporal sequence difficult to establish. Persons infected with HIV are at higher risk of developing reactive depression, AIDS-related dementia, and other neuro-psychiatric sequelae (Lyketsos et al., 1995): cross-sectional associations may reflect the consequences of, rather than risk for, infection.

Although lifetime rates of mental disorders in the U.S. have been estimated at 30% to 50% (Kessler et al., 1994), HIV rates are relatively low; 0.8% to 6.4% (Holmberg, 1996). Thus, even large samples will have few cases with both conditions, limiting both confidence in findings and the ability to examine specificity in the association between mental disorder and HIV.

To date, mental disorders have been implicated as a risk for HIV; however, no specific disorder has been identified as increasing risk (Sitzman et al., 1995). This article examines the association of mental disorders, in particular posttraumatic stress disorder (PTSD) with HIV/AIDS in a large epidemiologic sample of U.S. veterans.

Although veterans as a group do not suffer more from most mental disorders than the general population (Norquist, 1990), they do have higher rates of combat-related PTSD (Kulka, 1990). In addition, veterans are frequently socioeconomically disadvantaged and make up a substantial proportion of the homeless (Rosenheck et al., 1994). Thus, a veteran sample is a unique opportunity to examine the association between specific mental disorders and HIV infection.

### Methods

Data were taken from the 1992 National Survey of Veterans (NSV), conducted as part of an ongoing effort by the Department of Veterans Affairs (VA) to monitor characteristics of the veteran population, their service needs, and utilization of VA benefits. Veterans gave verbal consent for the interview, which was administered by telephone to veterans living in the community.

The sample was drawn from two sources. Random digit dialing of U.S. and Puerto Rican telephone numbers was used to identify veterans living in contacted households, and a random sample of veterans was drawn from three VA computerized databases; the VA Compensation and Pension File, for veterans receiving payments for service-connected disabilities; the patient treatment file, which lists all patients discharged from VA hospitals in 1992; and the outpatient VA clinic file, which listed all patients seen in outpatient clinics in the VA system in 1992.

Veterans were considered eligible for the study if they received an honorable discharge and were not on active duty at the time of the interview. Of the total sample of 11,645, 5,529 were from the household sample and 6,116 were from VA databases.

The dependent variable of interest in the present analyses was a self-reported history of a positive HIV test or AIDS. Veterans were asked "Have you ever been told by a doctor that you had a positive test for HIV, or that you had AIDS?" Independent variables of interest were a self-reported history of substance abuse, PTSD, or other mental disorder ("Have you ever been told by a doctor that you had. . ."). Other variables included age, race, sex, income, education, and period of military service.

Logistic regression models were used to determine a) the association between a reported positive HIV test or AIDS and sociodemographic characteristics; b) the association between substance abuse, PTSD, or other mental problems and HIV/AIDS; c) whether the association between PTSD, other mental problems, and HIV status was explained by substance abuse; and d) the interaction between substance abuse and PTSD in predicting HIV/AIDS.

### Results

Table 1 indicates the distribution of sociodemographic and psychiatric status variables for the sample, stratified on HIV status. Forty-three subjects (.37%) reported being HIV positive or having AIDS. They were more likely to be minority ( $p = .0001$ ), not have health insurance ( $p = .0001$ ), be divorced or single ( $p = .0001$ ), and have lower income ( $p = .0001$ ). There were no gender, education, or age differences in the rate of self-reported HIV status.

Of the 766 veterans who reported a diagnosis of drug or alcohol abuse, 11 (1.44%) were HIV positive. Of the 775 who reported a history of PTSD, 8 (1.03%) were HIV positive. Of the 1,045 with other mental or emotional problems 8 (0.77%) were HIV positive. Comorbidity was common: 26.7% of those with PTSD were also drug or alcohol abusers; 23.93% of those with other mental illnesses were substance abusers; and 40.52% of those with PTSD had another mental disorder (other than substance abuse).

Table 2 indicates the unadjusted HIV rates among each of the three groups. Those with substance abuse were 4.9 times more likely to be HIV positive than those without substance abuse ( $p = .0001$ ). Those with PTSD were 3.17 times more likely to be HIV positive than those without PTSD ( $p = .002$ ), and those with other mental or emotional problems were 2.38 times more likely to be HIV positive than those without ( $p = .024$ ).

TABLE 1  
*Sociodemographic Characteristics of Those with and without HIV+ Tests/AIDS, 1992 National Survey of Veterans*

| Variable                       | Sample without HIV+ test/AIDS |       | Sample with HIV+ test/AIDS |       | p <sup>b</sup> |
|--------------------------------|-------------------------------|-------|----------------------------|-------|----------------|
|                                | n                             | %     | n                          | %     |                |
| Gender                         |                               |       |                            |       |                |
| Males                          | 11074                         | 95.95 | 42                         | 97.67 | .5670          |
| Females                        | 467                           | 4.05  | 1                          | 2.33  |                |
| Ethnicity                      |                               |       |                            |       |                |
| White                          | 9669                          | 83.78 | 19                         | 44.19 | .0001          |
| Black                          | 1101                          | 9.54  | 17                         | 39.53 |                |
| Hispanic                       | 467                           | 4.05  | 7                          | 16.28 |                |
| Other                          | 304                           | 2.63  | 0                          | 0     |                |
| Insurance                      |                               |       |                            |       |                |
| None                           | 1533                          | 13.28 | 14                         | 32.56 | .0001          |
| Private                        | 3825                          | 33.14 | 6                          | 13.95 |                |
| Public and Private             | 3406                          | 29.51 | 4                          | 9.3   |                |
| Public                         | 2548                          | 22.08 | 13                         | 30.23 |                |
| Unknown                        | 229                           | 1.98  | 6                          | 13.95 |                |
| Period of service <sup>a</sup> |                               |       |                            |       |                |
| WWII                           | 4064                          | 35.21 | 6                          | 13.95 | .0040          |
| Korea                          | 2629                          | 22.78 | 8                          | 18.6  |                |
| Pre-Vietnam                    | 3001                          | 26    | 9                          | 20.93 |                |
| Vietnam                        | 3960                          | 34.31 | 15                         | 34.88 |                |
| Post-Vietnam                   | 2318                          | 20.08 | 15                         | 34.88 |                |
| Persian Gulf                   | 442                           | 3.83  | 2                          | 4.65  |                |
| Other                          | 1291                          | 11.19 | 3                          | 6.98  |                |
| Marital status                 |                               |       |                            |       |                |
| Married                        | 8550                          | 74.21 | 13                         | 30.23 | .0001          |
| Widowed                        | 580                           | 5.03  | 4                          | 9.3   |                |
| Divorced                       | 1500                          | 13.05 | 10                         | 23.26 |                |
| Never married                  | 892                           | 7.74  | 16                         | 37.21 |                |
| Income                         |                               |       |                            |       |                |
| \$0 to \$10,000                | 2513                          | 23.03 | 23                         | 54.76 | .0001          |
| \$10,000 to \$20,000           | 2663                          | 24.4  | 11                         | 26.19 |                |
| \$20,000 to \$40,000           | 3158                          | 28.94 | 7                          | 16.67 |                |
| \$40,000+                      | 2578                          | 23.63 | 1                          | 2.38  |                |
| Education                      |                               |       |                            |       |                |
| < High School                  | 2297                          | 20.01 | 12                         | 27.91 | .1740          |
| High School                    | 3218                          | 28.03 | 11                         | 25.58 |                |
| Some college                   | 3845                          | 33.49 | 17                         | 39.53 |                |
| College or +                   | 2121                          | 18.47 | 3                          | 6.98  |                |

<sup>a</sup>Numbers add to more than the total sample size because veterans could have served in multiple periods.

<sup>b</sup>p values are determined from chi-square tests for independence.

Logistic regression models assessed the association between HIV, PTSD, and other mental problems. An analysis of the association between PTSD and HIV indicated that those with comorbid substance abuse were at higher risk; therefore, an interaction term was fit between substance abuse and PTSD (Table 3). Those with PTSD alone were not at increased risk; those with substance abuse alone were 2.43 times more likely to be HIV positive. Those with both PTSD and substance abuse were 11.50 times more likely to be HIV positive than those with no PTSD or substance abuse.

A similar interaction term between substance abuse and other mental or emotional problems was not significant (Table 4). Although the risk to those with both substance abuse and other non-PTSD mental illnesses was elevated (OR = 5.83), it was not significantly different from the risk to those who were only substance abusers (OR = 4.19,  $p = .0015$ ).

TABLE 2  
*Univariate Associations between Psychiatric Diagnoses and HIV Infection/AIDS, 1992 National Survey of Veterans*

| Diagnosis            | Number with disorder | HIV+ (%)  | OR <sup>a</sup> | p <sup>b</sup> |
|----------------------|----------------------|-----------|-----------------|----------------|
| Substance abuse      | 766                  | 11 (1.44) | 4.91            | .0001          |
| PTSD                 | 775                  | 8 (1.03)  | 3.17            | .0020          |
| Other mental illness | 1045                 | 8 (.77)   | 2.38            | .0240          |

<sup>a</sup>OR refers to odds ratio

<sup>b</sup>p values calculated from a Wald chi-square test for H<sub>0</sub>: OR = 1

## Discussion

Veterans in this sample who reported PTSD and comorbid substance abuse were at exponentially increased risk for HIV infection. This analysis is one of the first to indicate that a particular mental disorder may present a risk for HIV infection.

Because HIV is associated with neuro-psychiatric sequelae, an etiologic hypothesis should rule out the possibility that an association is due to consequences of infection. Although the data are cross-sectional, we have some ability to determine the sequence of PTSD and HIV infection. The majority of veterans with PTSD in this sample (92.3%) served in the Vietnam War or before. Assuming that PTSD was associated with military service, and that the virus was introduced into the U.S. population in approximately 1976 (Commenges and Etcheverry, 1993), 3 years after combat in Vietnam ended, it is likely that PTSD predated HIV infection.

It is not possible to ascertain if the onset of substance abuse predated HIV infection. However, at least for Vietnam veterans, the widespread availability of illicit drugs to soldiers serving in Vietnam suggests that substance use may have begun concurrent with military service and the onset of PTSD (Blank, 1985). The mean age of onset for substance abuse is in the 20s (DSM-IV; APA, 1996), suggesting that for all but recent veterans the onset of substance abuse predated the introduction of HIV into the U.S.

The associated features of PTSD paint a plausible picture for HIV risk. A sense of foreshortened future, a vague affinity for dangerous situations, and substance abuse are common (Blank, 1985; Rosenheck, 1985). This may lead to risky behavior, both sexual and substance-related, such as infrequent condom use or frequent sharing of drug injection equipment.

Another explanation for the association between HIV and PTSD is socioeconomic status, a proxy for availability of mental health and HIV prevention services. The HIV positive veterans in this sample were primarily African American and Hispanic men with low incomes and without health insurance. Of those who reported HIV, only 54.9% reported ever

TABLE 3

*The Association between HIV Infection/AIDS and Comorbid PTSD and Substance Abuse, 1992 National Survey of Veterans*

| Disorder                      | n     | HIV+ | HIV+/1000 people | OR <sup>a</sup> | p <sup>b</sup> |
|-------------------------------|-------|------|------------------|-----------------|----------------|
| None                          | 10114 | 31   | 3.1              | 1.00            |                |
| PTSD alone                    | 569   | 1    | 1.8              | 0.57            | 0.58           |
| Substance abuse alone         | 539   | 4    | 7.4              | 2.43            | 0.09           |
| Both PTSD and substance abuse | 205   | 7    | 34.1             | 11.50           | 0.08           |

<sup>a</sup>OR refers to odds ratio

<sup>b</sup>p values calculated from a Wald chi-square test for H<sub>0</sub>: OR=1

having received treatment for HIV. This percentage is likely a combination of recent AIDS symptoms requiring treatment (95% of those who had ever been treated were treated in 1992, the year of the survey) and reduced access to medical care.

Although the association between other mental disorders and HIV was not statistically significant after controlling for substance abuse, the odds ratio was elevated. It is likely that there was not enough power to detect a statistically significant association. We therefore suggest that the potential risk to other psychiatric patients not be dismissed.

There are several limitations to these data. First, of the 17 medical problems asked about, the HIV question had the highest refusal rate (.3% compared with .1% for other conditions). It is likely that both HIV infection and mental illness are under-reported. In addition, the self-report nature of the data also required that a respondent had been tested for HIV or evaluated for mental illness. As mentioned above, many people never seek specialty mental health services. Rates of HIV testing are low even among high risk populations, and among those who are tested, many do not return for results. Both of these factors could serve to underestimate associations. Finally, due to the cross-sectional nature of the data, the association between PTSD and HIV may be underestimated by selective mortality—those at greatest risk may have died before the interview.

Despite the limitations, the analyses suggest that PTSD combined with substance abuse may be highly lethal. However, much remains to be known. For example, results are difficult to generalize to women, because women make up a small proportion of veterans. However, PTSD is not rare in the general population (7.8%–9.2%; Breslau and Davis, 1992; Kessler et al., 1994), suggesting that women with PTSD may also be at higher risk for HIV infection. Further research should also investigate whether other comorbid conditions, such as personality disorders, increase or modify the risk found here.

The risk of HIV infection among the mentally ill in this sample is high (OR = 2.38,  $p = .024$ ). Al-

TABLE 4

*The Association between HIV Infection/AIDS and Comorbid Mental Disorders and Substance Abuse, 1992 National Survey of Veterans*

| Disorder                                | n     | HIV+ | HIV+/1000 people | OR <sup>a</sup> | p <sup>b</sup> |
|---|-------|------|------------------|-----------------|----------------|
| None                                    | 10027 | 28   | 2.8              | 1.00            |                |
| Substance abuse alone                   | 517   | 6    | 11.7             | 4.19            | .0015          |
| Mental illness alone                    | 801   | 4    | 5.0              | 1.80            | .2728          |
| Both mental illness and substance abuse | 252   | 4    | 16.1             | 5.83            | .7597          |

<sup>a</sup>OR refers to odds ratio

<sup>b</sup>p values calculated from a Wald chi-square test for H<sub>0</sub>: OR=1

though largely explained by comorbid substance abuse, this finding suggests that psychiatric treatment efforts that include HIV prevention efforts might help identify patients in need of substance abuse care and give AIDS prevention information to all psychiatric patients regardless of comorbid substance abuse. As increasing numbers of AIDS patients come from the population of mentally ill, with limited economic and social resources, demands for publicly funded AIDS care will increase. Increasing prevention efforts and identification of HIV positive individuals among the mentally ill may help curb the epidemic in this vulnerable population.

## Conclusions

PTSD with comorbid substance abuse confers significantly increased risk for HIV infection. In addition, other mental disorders also increase risk. We suggest that psychiatric patients be targeted by clinicians for HIV prevention and treatment efforts and that further research be done to determine the effectiveness of traditional prevention efforts in mentally ill populations, whether mental disorders increase risk in the absence of substance abuse, the mechanisms of these effects, and the role of psychiatric comorbidity.

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